

Development and Implementation of a Forest Nursery Accreditation Policy at a Local Level in Leyte, Philippines

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Abstract Through a series of workshops with the stakeholders including nursery operators, tree farmers, staff of the Department of Environment and Natural Resources, local government units and the academe, a forestry seedling nursery accreditation policy was developed. The resulting policy was subsequently implemented by the municipal government of Palompon, Leyte. The accreditation policy encouraged nursery operators to follow smallholder-based best management practices for tree nurseries. Implementation of the nursery accreditation policy improved farmers' knowledge and skills in the production of high quality seedlings, encouraged adoption of BMP for forest nurseries, provided additional source of income for the farmers, enabled members of the groups operating the communal nursery to forge closer relationship with each other, encouraged utilization of farmers' free time in productive activities, developed farmers' confidence in producing high quality planting materials, and gained for the farmers favourable attention from various organizations and groups. The Bennett's hierarchy of project outcomes showed that the implementation of accreditation scheme achieved high

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levels of outcomes, indicating that it led to substantial improvements in the lives of the farmers.

Keywords Germplasm improvement · Seedling quality · BMP · Local government unit · Bennett's heirarchy

Introduction

Successful forest conservation and regeneration efforts require the use of reproductive materials that meet appropriate genetic, morphological and physiological quality standards (Karrfalt 2003). Research and field experiences invariably show that seedlings of low quality have a high mortality rate when outplanted. Briefly, a high quality planting stock, is that which is: grown from germplasm collected from selected sources; healthy and with dark green leaves; having sturdy stems and with relatively large collar diameter; having root systems that are free from deformities and are dense with many root hair tips; having balanced root and shoot mass; and fully hardened, accustomed to full sunlight and reduced water and fertilizer (Gregorio et al. 2009).

In the Philippines, in response to the multi-faceted problems on forest denudation, many organizations and agencies are implementing reforestation and tree farming projects. Although these concerted efforts have led to the restoration of some of the country's forests, much remains to be done. For example, citing data from the Forest Management Bureau and the National Mapping and Resource Information Authority, Mercado and Duque-Piñon (2008) reported that in 2003, the country's forest cover increased to 12%. At the same time, they indicated that about 5.5 M ha of the country's denuded land is still denuded and in need of immediate rehabilitation. To respond to this challenge, the country needs to sustain its reforestation and tree farming programs.

As in many developing countries, the use of low quality seedlings is common in reforestation projects and tree plantations in the Philippines. The reason is that the country's nursery sector does not produce high quality planting stock due to a host of problems, including: (1) the current organization of the public and private sector nurseries is not delivering seedlings of appropriate quality to tree farmers; (2) there is no policy either at the local and national level that regulates the quality of planting materials of forest trees being used in tree farming and reforestation programs; (3) most forest nurseries—particularly those privately-owned—fail to sustain their operation. Crowding out of the private nursery sector by public sector nurseries (including those funded with development assistance money) appears to be restricting the development of the entire sector; and (4) the Department of Environment and Natural Resources (DENR), the agency in charge of reforestation projects and promoting tree farming, is not active in regulating the quality of planting stock of forest trees.

The project, *Enhancing tree seedling supply via economic and policy changes in the Philippine nursery sector* (locally known as Q-Seedling Project), funded by the Australian Centre for Interinational Agricultural Research (ACIAR), is being

implemented to address these issues, and ultimately to improve the operational effectiveness of the nursery sector in the country. In a series of workshops with various stakeholders conducted as part of the implementation of this project, nursery accreditation and seedling certification were among the interventions suggested to promote sustainable forestry production and availability of high quality planting stock, and to improve the financial viability of forest nursery enterprises.

Alternatively referred to as *certification*, Harrison and Gregorio (2009) describe *accreditation* as a process involving a second party (often government) carrying out some process of assessment of practices as well as monitoring, hence being satisfied that performance is—and continues to be—adequate, and providing formal recognition of this performance. Hansen et al. (2008, p. 1) defined forest certification as:

a system for identifying well-managed forestland. In this context, sustainability includes maintenance of ecological, economic, and social components. Products from certified forestland can, through chain-of-custody certification, move into production streams and in the end receive labeling that allows customers to know the product came from a certified, well-managed forest. Fully implemented, certification will become a market-based mechanism to reward superior forest management. Forest certification has been widely debated, with schemes including certification by the FSC (Forest Stewardship Council) and PEFC (Pan-European Forest Certification).

Nursery accreditation has been applied by various countries to produce high quality planting materials. A case in point is in the Australian Cotton Industry where cotton farmers had to apply best management practices (BMP) in cotton production. For this initiative, a BMP manual was developed on the use and storage of insecticides, based on a whole-of-industry environmental audit and on findings from a major research program involving research projects conducted at various institutions in the main Australian cotton growing states (Harrison 2003). The adoption rate was high, because non-adopters were subjected to more stringent regulatory controls over use of agrochemicals. In that adoption did impose some costs, a number of financially marginal growers chose to leave the industry rather than adopt BMP.

Vietnam has a comprehensive program on improving the physical and genetic quality of forest reproductive materials for government-initiated reforestation projects. Forest nursery accreditation, germplasm source certification and seedling certification are major components of this program (Harrison and Gregorio 2010).

With the assistance of the Q-Seedling Project, Palompon, a local government unit in Leyte (Fig. 1), implemented a nursery accreditation policy. This paper describes the process of developing the policy and experiences in implementing it at the local level.

Research Method

Ascertaining the Need for Nursery Accreditation Policy

The idea of developing and implementing a nursery accreditation policy emerged from the policy assessment model based on the earlier work of Gregorio et al.

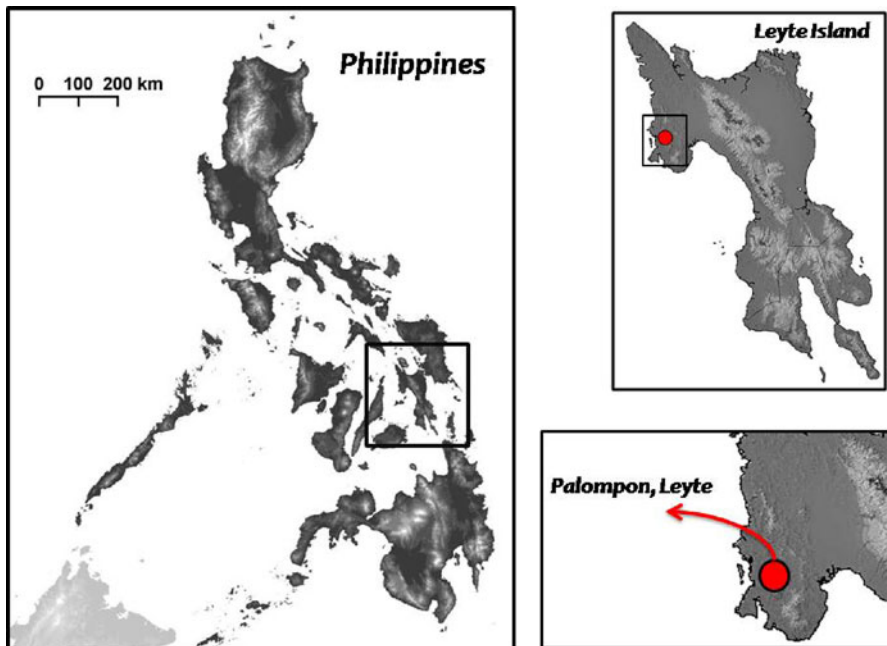


Fig. 1 Map showing Palompon, Leyte

(2008) and on results of the survey of the nursery sector in Leyte and Mindanao and a study tour by Q-Seedling Project participants in key Southeast Asian countries. The model applied a Bayesian Belief Network (BBN) and was developed in the stages of implementation of the Q-Seedling Project. In this project, the model was used as a tool to identify key leverage points for intervention measures to be pilot tested by the project in conjunction with the DENR and the local government units. Details of the model are presented in Gregorio et al. (2010).

Sensitivity analyses of the model showed that improving *Technical Skills* was consistently a highly important intervention for lifting the operational effectiveness of the nursery sector. *Training*, however, which directly influences *Technical Skills* in the BBN model, was found to have little influence on *Technical skills*, for the individual and communal nursery groups in particular. Further, improvement of the *Germplasm pathway* is an important factor in improving the operational effectiveness of the entire forest nursery industry. Another interesting finding arising from the BBN was that implementing interventions simultaneously, as an intervention package, is much more likely to improve nursery effectiveness than implementing individual intervention measures in isolation. For example, even without improving the *Nursery Funding*, increasing the *Quality of Seedlings* together with creating a favourable *Market* for seedlings improves the operational effectiveness of the private and community nursery subsectors.

Unfortunately in the Philippines, there is no policy that controls the quality of tree seedlings used in reforestation and tree plantation projects. Thus, during the planning workshop of the Q-Seedling Project held in February 2008, stakeholders

from various sectors including the DENR, Department of Agriculture (DA), local government units (LGUs), academe, private and community nursery operators, tree farmers, timber processors and industry representatives identified nursery accreditation as a key intervention to improve the quality and financial viability of the seedling nursery enterprise.

Development of the Forest Nursery Accreditation Policy

Drafting the Policy

In response to the result of the workshop in February 2008, the Q-Seedling Project arranged workshops and meetings with various stakeholders in Leyte including tree farmers, nursery operators, timber processors, and staff members of DENR, DA and the Visayas State University (VSU). The main objective of these workshops was to design the mechanisms for accrediting forest nurseries and draft the nursery accreditation policy.

At these workshops, perspectives from various stakeholders were presented. Staff members of Development Bank of the Philippines (DBP) presented the seedling assessment criteria adopted by this agency in implementing its DBP Forest Project. Also a representative from the Bureau of Plant Industry (BPI) of DA presented BPI's mechanisms for assessing and accrediting fruit tree nurseries. These presentations formed the basis for developing the forest nursery accreditation policy and designing the implementation process.

Finalizing the Accreditation Policy and Consultation with Stakeholders

The implementation of the DBP Forest Project in Palompon, Leyte provided an opportunity to pilot test the implementation of the forest nursery accreditation policy. Upon knowing the initiatives of the Q-seedling Project in developing the forest nursery accreditation policy, the municipal government of Palompon expressed interest to implement this policy to ensure that only high quality seedlings will be planted in their DBP Forest Project. This project aims to rehabilitate the watersheds of Palompon and promote high quality seedling production and tree farming as alternative source of livelihood of farmers within the area covered by the DBP Forest Project. The DBP Forest Project had a requirement of about 40,000 seedlings of forest trees in 2 years (2009 and 2010).

Through a series of meetings with the officials of the Palompon, particularly the Municipal Environment and Sustainable Development Office (MESDO), a draft was prepared of Municipal Ordinance No. 327-010909 institutionalizing the adoption of a LGU-based forest nursery accreditation policy for the DBP Forest Project implementation in the municipality of Palompon. The resolution entitled, 'An Ordinance Providing Regulations on the Accreditation of Forest Nurseries within

the Municipality of Palompon’—was adopted during the Regular Session of the *Sangguniang Bayan*¹ on September 1, 2009.

After finalizing the accreditation policy, a series of public hearings was conducted throughout the municipality, involving farmers, the public sector and environmental groups. The proposed ordinance was discussed in the training workshops on high quality tree seedling production with forest nursery operators within Palompon. Among other things, it was emphasized that for the DBP Forest Project in Palompon, seedlings will be purchased only from accredited tree nurseries.

Capability Development and Production of Communication Materials

A series of training workshops was conducted and communication materials were developed in support of the implementation of the nursery accreditation policy with a view to improving nursery operators and managers’ skills in producing high quality seedlings. The focus was on promoting adoption of BMP for forest nurseries. Design of these communication activities were based on the information needs identified through the surveys and focus group discussions conducted during the early stages of the Q-Seedling Project. The surveys covered nursery operators and farmers, including those in Palompon, Isabel, Bato and Libagon, in Southern Leyte province. Results showed that farmers had poor understanding of the concept of seedling quality and lacked technical know-how in producing high quality seedlings. Thus, the communication activities applied motivational appeals to encourage adoption of the BMP. Table 1 presents a summary of the practices included in the BMP manual.

Ensuring Supply of High Quality Germplasm

An inventory of mother trees of various timber species was carried out in Leyte Island in October to December 2008. The phenotypic quality of the mother trees was assessed following the DENR guidelines in assessing ‘plus trees’ as set out by Cacanindin (2009). The location of mother trees was taken using a Global Positioning System device. Some of the germplasm used by nursery operators in the pilot areas was collected from identified superior mother trees. These mother trees are envisaged to become part of the sources of germplasm for nurseries applying for nursery accreditation.

Determining the Effects and Level of Outcomes of Nursery Accreditation

Focus group discussions were conducted in two barangays² of Palompon—Brgy. Cambacbac and Brgy. Tinubdan—to identify the benefits farmers derived from the

¹ *Sangguniang Bayan* means Municipal Council.

² A barangay (or village) is the basic government unit in the Philippines.

Table 1 Summary of the BMPs for forest nurseries promoted by the project

Concept	Important aspects
The concept of seed quality	Physical and genetic factors that determine seedling quality, characteristics of high quality seedlings, advantages of growing high quality seedlings, characteristics of low quality seedlings, and disadvantages of low quality seedlings.
Establishment of forest nurseries	Steps in establishing forest nurseries, types of forest nurseries, reasons for putting up a nursery, location of a nursery, structures and tools required of a nursery.
Germplasm collection, processing and storage and pre-sowing techniques	Germplasm sources, wildling collection, handling wildlings, breaking seed dormancy, germination media, and sowing techniques.
Potting techniques and potting media preparation	Techniques for potting seedlings and wildlings and appropriate potting media.
Seedling maintenance	Ensuring high viability of seedlings when outplanted—watering, fertilization, and the importance of hardening.

implementation of the nursery accreditation scheme. The FGDs were participated in by the members of the group that set up and maintained the communal nursery. A thematic analysis (Aronson 1994) was conducted on responses. This involved producing transcripts of responses to the questions during the FGDs, which were read and re-read to identify regular recurring benefits described by the nursery operators. These regular recurring patterns were then classified into themes which gave an overall view of the benefits farmers experienced from the implementation of the policy.

Bennett's hierarchy of program outcomes—described in de los Santos (1992) and Bennett and Rockwell (2003)—was used as guide to determine the level of program outcomes. This hierarchy of program outcomes is presented Table 2.

Bennett's hierarchy of program outcomes contains two major components: inputs to a program and outcomes related to those inputs (de los Santos 1992). Program inputs contain three separately ordered categories, namely programming of extension activities, implementation of the program by implementers, and 'farmers' participation in extension activities. The first level includes staff qualifications and time, money and other tangible resources, and any other input which is needed to plan and implement activities. Activities are identified as any events which take place in the life of an educational program, which includes its conception, planning, implementation and evaluation. The third level of the inputs of a program is the client involvement, which encompasses client demographics, number of clients served, and extent of involvement. If, level one in the hierarchy, properly planned and implemented, leads to level two and so on, then the three levels which make up the inputs to a program, as the group, will lead to the outcome level (de los Santos 1992; Bennett and Rockwell 2003).

Table 2 Levels of program outcomes based on Bennett's Hierarchy of Program Outcomes (de los Santos 1992)

Level	Description
Outcome	
7	Consequences for society and consequences for the target group
6	Behavioral changes in the target group
5	Changes in knowledge, attitude, skills, aspiration and group norms
4	Farmers' in extension activities
Input	
3	Farmers' participation in extension activities
2	Implementation of the program by implementers
1	Programming of extension activities

In this study, transcripts of the FGDs were read iteratively and the outcomes shown in the themes were noted. Each theme did not necessarily fall to one outcome only, but may have also illustrated other outcomes in the hierarchy.

Results and Discussion

Salient Features of the Accreditation Policy

The accreditation policy spells out the objectives, composition of the accreditation team, requirements for accreditation, accreditation process, criteria, incentives for accredited nurseries, and penalties for violations. The guidelines are discussed in simple terms in the guide to forest nursery accreditation distributed to farmers who expressed interest in putting up a nursery and the community leaders. One of the important highlights in the nursery accreditation policy is the set of criteria used for evaluating nurseries. These criteria are listed in [Appendix](#).

Improvement of Nursery Operators' Skills in Q-Seedling Production

Training workshops were carried out for the nursery operators and relevant staff of the LGU and DENR who conduct the nursery assessment and accreditation. Topics delivered during the training sessions included the production of high quality tree seedlings and assessment of tree seedlings for accreditation. Various communication materials were developed and distributed to nursery operators and extension workers. These included: (1) Guide to producing high quality tree seedlings; (2) Trainers' guide and videos on producing high quality tree seedlings; (3) Instructional posters on seedling production technologies; (4) Jingle about Q-seedlings; and (5) Guide to nursery accreditation.

Use of High Quality Germplasm

Following the BMP for forest nurseries, only high quality seeds were used in growing seedlings. For instance, superior seeds of falcata (*Albizia falcataria*) and mosisi (*Maesopsis eminii*) were procured from Mindanao. The nursery operators

also collected wildlings from the superior mother trees identified and marked during the inventory of mother trees undertaken as part of the implementation of the Q-seedling project.

To sustain availability of high quality germplasm, a Tree Seed Centre is being established at VSU, which will distribute seed of various tree species and provide information on the location and phenology of mother trees.

Activities of Nurseries that Received Accreditation

In the early part of the project implementation, the five barangays that were chosen as pilot sites for the DBP Forest Project in Palompon each agreed to put up a nursery and sell their seedlings to the DBP Forest Project which at that time required many seedlings to rehabilitate its watersheds. Upon issuance of Municipal Resolution No. 327-01090, accreditation of the barangay nurseries was conducted. Out of the five nurseries, only three passed, namely the nurseries of Brgy. Cambacbac, Brgy. Tinubdan and the Municipal Nursery of Palompon. For the seedling procurement program of the DBP Forest Project, seedlings were purchased from Brgy. Cambacbac and Brgy. Tinubdan. The Municipal Nursery focused on distributing seedlings free of charge to groups that implemented their tree planting activities and the municipal government's sidewalk tree planting project.

The communal nurseries in Brgy. Cambacbac and Brgy. Tinubdan utilize locally available materials and are operated by a group of farmers. In Brgy. Cambacbac, the group was initially composed of 12 members. However, having realized the benefits derived by the members, including the income they shared in January 2010, membership has grown to 18. Located near the basketball court and the church, the Cambacbac communal nursery produces seedlings of manguim (*Acacia manguim*) and falcata (*Albizia falcataria*). As of April 2010, it was able to dispose 21,444 seedlings which earned them a gross income of PhP 171,552 (USD 3812.267).³

In Brgy. Tinubdan, the communal nursery is located near the river, their source of water for the nursery. As of April 2010, it has already sold 8,890 seedlings and gained a gross income of PhP 71,120 (USD1,580.44). The seedlings produced are mostly from wildlings collected from near the mother trees identified through the mother trees inventory. The native tree species included mosisi (*Maecosopsis eminii*), narra (*Pterocarpus indicus*), molave (*Vitex parviflora*), anislag (*Securinega flexuosa*) and antipolo (*Artocarpus blancoi*). The exotic species were falcata (*Abizzia falcataria*) and mahogany (*Sweitenia mahogani*). Membership is composed of eight farmers. However, early in 2010, a member decided to put up a nursery on his own. In May 2010, he had about 4000 seedlings ready for disposal.

Benefits Derived from Gaining Nursery Certification

The thematic analysis of the responses gathered through the FGD revealed that the nursery operators have derived the following benefits from their participation in the

³ The USD equivalents reported in this paper are the approximate values during the time the data were gathered.

nursery accreditation: (1) improved knowledge and skills in high quality seedling production, (2) encouraged adoption of best management practices, (3) an additional source of income, (4) opportunity to forge close relationships with each other, (5) encouraged utilization of farmers' time in productive activities, (6) confidence in ability to produce high quality planting materials, and (7) favorable attention from various groups.

Theme 1: Improved Knowledge and Skills in High Quality Seedling Production

The communal nursery operators said that their effort to have their nursery accredited has given them the opportunity to improve their knowledge and skills in high quality seedling production. They attributed this improvement to the training workshops on tree seedling production and the communication materials distributed by the Q-Seedling Project. They value this knowledge because, according to them, this is something that they can share with their children.

Theme 2: Encouraged Adoption of Best Management Practices

The nursery accreditation scheme encouraged farmers to adopt BMP for tree nurseries. They reported that, based on their agreements, the DBP forest will buy seedlings only from accredited nurseries. Hence it was necessary that they follow BMP because this was among the requirements for accreditation.

Theme 3: Provided an Additional Source of Income

Foremost of the benefits the nursery operators have derived was the additional income they received from participating in the communal nursery. In fact, according to the barangay captain of Brgy. Cambacbac, in January 2010 they were able to generate a net operating profit of PhP 7000 (USD155.56) from their first production cycle from late August to November 2009 of the previous year. As agreed, the DBP Forest Project purchased the seedlings. The PhP 7000 profit was divided among the 12 members. Additional income from nursery operation has also been reported by the group in Brgy. Tinubdan. At the time of writing, this group of farmers is waiting for the rain to come. When the rainy days come, the DBP Forest Project will buy their seedlings. They said that planting of trees in their farms had to stop due to El Nino.

Theme 4: Opportunity to Forge Close Relationships with Each Other

According to the barangay captain of Cambacbac, members of the group operating the communal nursery report for a 'pintakasi'⁴ every Tuesday and Wednesday.

⁴ 'Pintakasi' means cooperative work. In this case, farmers worked to achieve a particular project task, e.g. building nursery structures, bagging and other tasks.

While working they interact and these interactions have led them to establish closer relationship with each other. Thus, families with previous misunderstandings have mended. For the barangay captain, closer relationships are important because this is the means for attaining peace and cooperation in the community.

Theme 5: Encouraged Utilization of Farmers' Time in Productive Activities

According to the members of the group operating the communal nursery in Brgy. Cambacbac, now that they are busy with their nursery operations, they are no longer tempted to engage in such activities as playing cards and rumour mongering, especially the women. As one farmer said, 'Cockfighting and playing cards which are played on Sundays and lazy days have been displaced in favour of working in the nursery'.

Theme 6: Greater Confidence in Producing High Quality Planting Materials

Farmers reported that through their participation in the communal nursery, they now feel confident that they can produce high quality materials. They have planted some of their seedlings on their farms, and observed that their seedlings grew fast and were healthy. For example, as of January 2010, their falcata farms established from late August to November 2009 were already about 3 ft tall. On the other hand, in the other upland development project in which they have participated, the seedlings given to them all died. They said that should there be demand for high quality tree seedlings, their communal nursery could surely supply the need.

Theme 7: Favorable Attention from Various Groups

Members of the communal nursery in Brgy. Cambacbac claimed that since their success in adopting BMP for nurseries, many people and organizations have begun noticing them. They reported that media groups, students (both local and foreign), and researchers have been visiting them since they started producing and selling high quality seedlings. According to them, towards the end of 2009, a crew from the television channel CNN came to take videos of their nursery and interviewed them. A group of students from Germany also visited and interviewed them about their nursery practices. This is in addition to the regular visits by the Q-Seedling Project staff and the staff of the municipal government of Palompon who usually take photos and show these in various places and special gatherings.

Levels of Program Outcomes

To assess the levels of impacts of the implementation of the accreditation scheme, the effects reported by respondents were classified according to Bennett's Hierarchy of Program Outcomes. Table 3 shows that outcomes fell into three higher

Table 3 Levels of the outcomes of nursery accreditation

Levels of outcome	Themes of effects	Site where effect was felt
5) Farmers' change in KASA	Improved knowledge and skills in high quality seedling production	Brgy. Cambacbac and Brgy. Tinubdan
6) Behavioural changes in farmers	Encouraged adoption of BMP for forest nurseries	Brgy. Cambacbac and Brgy. Tinubdan
7) Consequences for the barangays and consequences for the farmers	Provided an additional source of income	Brgy. Cambacbac and Brgy. Tinubdan
	Enabled them to forge closer relationship	Brgy. Cambacbac and Brgy. Tinubdan
	Encouraged utilization of time productive activities	Brgy. Cambacbac
	Developed confidence in producing high quality planting materials	Brgy. Cambacbac and Brgy. Tinubdan
	Gained favorable attention from various organizations and groups	Brgy. Cambacbac

No outcome fell under Levels 1–4

categories, i.e. Levels 5, 6 and 7. The outcome, Improved knowledge and skills in high quality seedling production fell into Level 5, Change in farmers' knowledge, attitude, skills and aspiration (KASA). The outcome, Encouraged adoption of BMP for forest nurseries, was classified as Level 6.

Notably, most of the effects were in the highest level, Consequences for the society and target group. These included the following: (1) Provided an additional source of income; (2) Led communal nursery members to forge closer relationship; (3) Encouraged communal nursery members to use their time in productive activities; (4) Developed confidence in producing high quality planting materials; and (5) Gained for them favorable attention from various organizations and groups. This indicates that implementation of the accreditation policy in Palompon has already achieved a great change and improvement to the farmers.

Multiplier Effects of the Accreditation Policy

The nursery accreditation initiative has spilled over to other municipalities. In early 2010, four local government units in Regions 11 and 12 in southern Mindanao indicated an interest in implementing the nursery accreditation policy in their respective municipalities, namely Malungon in Sarangani Province, Kiblawan in Davao del Sur, Tampakan in South Cotabato and Columbio in Sultan Kudarat

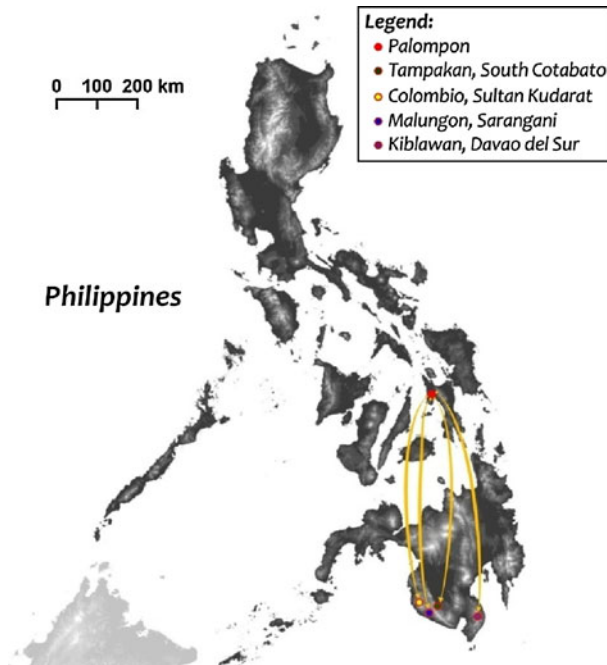


Fig. 2 Local government units in Mindanao that intend to implement the nursery accreditation policy

(Fig. 2). A workshop to design the implementation strategy of forest nursery accreditation in these four municipalities was held and hands-on training was conducted on the production of high quality seedlings, in January 2010. Also, In March 2010, a follow-up workshop was conducted with representatives of the LGUs to draft the accreditation policy.

In collaboration with DENR Region 10, the project has drafted a national nursery accreditation policy and developed the nursery accreditation guidelines and criteria based on the results of the workshops in Leyte and Mindanao. In a meeting with senior staff of the Forest Management Bureau (FMB) and the Ecosystems Research and Development Bureau of the Department of Environment and Natural Resources on April 5, 2010, it was announced that the draft of the policy, guidelines and criteria served as a major input in crafting the ‘Germplasm Accreditation and Nursery Accreditation Policy’ issued as Department Administrative Order Number 2010–11 by Sec. Horacio Ramos on May 5, 2010.

Policy Implications

The implementation of the accreditation policy brought various effects to the farmers. However, the sustainability of their nurseries is threatened by the lack of market for the tree seedlings they are producing. For example, when the DBP Forest

Project ends, there is a question as to who will purchase their tree seedlings. Linking the nurseries to the market is a challenge for government agencies mandated to promote reforestation and tree farming projects, including the DENR. Knowing the high quality of tree seedlings by the accredited nurseries in Palompon, DENR offices could promote sales by prioritizing these nurseries in their tree seedlings acquisition program. To make the nurseries in Palompon favourably known to reforestation projects implementers and tree plantation owners outside Leyte, information dissemination support is needed, which could be done by the local government of Palompon, DENR and academe.

One important factor that may have led farmers to realize income from their nursery operation was the fact that the municipal office in Palompon did not compete with the nurseries of the farmers. Instead, it provided the seedling needs of the municipal government. This result highlights the fact that nursery operation is a potential source of income to farmers only if government nurseries do not crowd out the ones established by the private sector.

Farmers are now harnessing the superior mother trees as sources of high quality germplasm. Unfortunately, these trees are the ones preferred by illegal loggers because they contain high volumes of merchantable timber. This means that protection and conservation of the mother trees could be a challenge especially for those growing in the natural forest. The marks and tags attached to mother trees may deter timber poachers from felling these trees. However, a community-based mother tree protection initiative wherein locals protect the mother trees in their respective communities is promising. For this approach to work, it is important that communities appreciate the ecological and economic importance of the trees. Capability development activities on protecting and conserving mother trees and an information campaign on the importance of these mother trees are necessary. Another option is developing a mechanism wherein owners of mother trees could earn income by selling the seeds and wildlings from the mother trees.

Considering the value of mother trees as sources of planting materials, efforts to identify superior mother trees throughout the country should be sustained so that these can also be harnessed by reforestation and tree farming programs, protected and conserved.

Consistent with the observations by Mercado, Dargush and Gregorio (2010) in West Java and Harrison and Gregorio (2010) in Thailand and Vietnam, overall findings of this study show that governments can improve the operational effectiveness of the sector by implementing a nursery accreditation policy.

Appendix

Evaluation Sheet for Accrediting Forest Nurseries in Palompon, Leyte

NURSERY ACCREDITATION ASSESSMENT FORM	
(To be Completed by the Accreditation Team)	
Name of Nursery: _____	
Name of Nursery Operator: _____	
Address of Nursery: _____	
Telephone Number: _____	
1. Seedling Physical Quality (Destructive sampling of 50 seedlings selected using Quota Sampling) Maximum of 15 points)	
A. Health – absence of pests and diseases	
0	Poor More than 15 seedlings in the sample are affected by pests and diseases
1	Moderate 10-15 seedlings in the sample are affected by pests and diseases
2	Good 5-9 seedlings in the sample are affected by pests and diseases
3	Excellent Less than 5 seedlings in the sample are affected by pests and diseases
B. Stem form – straightness of the stem	
0	Poor More than 15 seedlings in the sample have branched shoots, with two or more stem leaders and bent shoots more than 30 degrees from stem axis
1	Moderate 10-15 seedlings in the sample have branched shoots, with two or more stem leaders and bent shoots more than 30 degrees from stem axis
2	Good 5-9 of seedlings in sample have branched shoots, with two or more stem leaders and bent shoots more than 30 degrees from stem axis
3	Excellent Less than 5 seedlings in the sample have branched shoots, with two or more stem leaders and bent shoots more than 30 degrees from stem axis.
C. Root form – evidence of root deformities, including J-roots, pot-bound roots and root curling.	
0	Poor More than 10 seedlings in the sample have J-rooted, pot-bound and curled roots and primary roots growing out from container and penetrating into the ground
1	Moderate 5-10 seedlings in the sample have J-rooted, pot-bound and curled roots and primary roots growing out from container and penetrating into the ground
2	Good 1-4 seedlings in the sample have J, pot bound and curled roots and primary roots growing out from container and penetrating into the ground
3	Excellent None of the seedlings in the sample have J, pot bound and curled roots and primary roots growing out from container and penetrating into the ground
D. Sturdiness – robustness of the stem, assessed using the Sturdiness Quotient (SQ); ideal value is less than 6.	
0	Poor More than 15 seedlings in the sample of have SQ of more than 6
1	Moderate 10-15 seedlings in the sample have SQ of more than 6
2	Good 5-9 samples have SQ of more than 6
3	Excellent Less than 5 seedlings in the sample have SQ of more than 6)
E. Shoot-root ratio – balance of shoot to root biomass	
0	Poor More than 15 seedlings in the sample have S:R value of 2 and above
1	Moderate 10-15 seedlings in the sample have S:R value of 2 and above
2	Good 5-9 seedlings in the sample have S:R value of 2 and above
3	Excellent Below 5 seedlings in the sample have S:R value of 2 and above.
2. Skills of the Nursery Operator to Produce High Quality Seedlings	
a. Training – nursery operators' participation in training on nursery development and management conducted by DENR or any other reputable agency providing high quality training.	
1	Attended one training event
2	Attended two or three training events
3	Attended more than three training events
b. Experience – length of time of actual exposure to nursery seedling production of the nursery operator.	
1	Have operated a nursery for at least one year but less than two years
2	Have operated a nursery for two to five years
3	Have operated a nursery for more than two years
3. Nursery Set-Up and Facilities	
a. Facilities – presence of necessary nursery facilities for high quality seedling production.	
0	Has a hardening bed, but not elevated
1	Has a hardening bed which is elevated
2	Has a soil sterilization facility
3	Has a soil sieving facility
b. Seedling container	
0	Nursery uses makeshift materials (e.g. cans, juice packs, plastic cups)
1	Nursery uses polybags
2	Nursery uses hyko trays or equivalent containers with root trainers
c. Potting mix – relates to texture and nutrient content of the potting mix.	
0	Clayey soil
0.5	Clay soil plus drainage enhancers (e.g. sand, rice hulls, sawdust)
1.0	Clay soil plus drainage enhancers (e.g. sand, rice hulls, sawdust) plus fertilizer (organic and inorganic)
1.0	Topsoil (topsoil with high organic matter content)
1.5	Topsoil plus drainage enhancers
2.0	Topsoil plus drainage enhancers plus fertilizer (either organic or inorganic fertilizer)
4. Production Capacity – capacity to supply planting stock.	
0	Nursery can produce less than 1000 seedlings per production season
1	Nursery can produce 1,000 to 5000 seedlings per production season
2	Nursery can produce more than 5000 seedlings per production season
MAXIMUM RATING: 32 points	
PASSING SCORE: 20 points	
TOTAL SCORE: _____	

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